

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Application of  
Hoffmann et al.

Confirmation No. 3798

Serial No. 10/817,558

Examiner: Saira Bano Haider

Filed: 04/02/2004

Art Unit: 1711

TITLE: REACTIVE HOT MELT ADHESIVE

DECLARATION UNDER 37 C.F.R. SECTION 1.132

I, Dr. Horst Hoffmann, state and declare as follows:

1. I have studied at the University of Leuna/ Merseburg in Germany and hold a doctoral degree in Chemistry. I am a research chemist at Henkel KGaA (assignee of the above-referenced application) and one of the inventors named in the above-referenced application.
2. I have worked in the field of laminating films on substrates such as wood, plastic or metal for the past 15 years. I am familiar with polyurethane adhesives, the processes for laminating films onto different substrates, and the various testing methods used in connection with such lamination processes.
3. I have read and am familiar with the above-referenced application, the Office Action mailed November 27, 2006, and the prior art references discussed therein.
4. I understand that Claims 1, 3, 4 and 6-18 and 20-22 are currently pending in the application, that Claims 1, 3, 4, 6 and 20-22 have been allowed, that Claims 7-9 and 12-16 are rejected, and that Claims 10, 11, 17 and 18 have been objected to. I further understand that Claims 7 and 12 are the only

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independent claims that are rejected and that all the other rejected claims depend from either independent Claim 7 or independent Claim 12.

5. I understand that rejected independent Claim 7 currently reads as follows:

A method for gluing a poly(meth)acrylate film to a substrate comprised of a thermoplastic, wood or aluminum, said method comprising using an adhesive to join said poly(meth)acrylate film to said substrate, wherein said adhesive is a one-component, moisture-curing hot melt adhesive and comprises at least one reaction product with reactive NCO groups produced by reaction of

- a) at least one di- or polyisocyanate;
- b) at least two diols selected from the group consisting of polyether-polyols and alkylene diols, wherein at least one diol has an average molecular weight above 1,000 and at least one diol has an average molecular weight not greater than 800;
- c) at least one crystalline or partly crystalline polyester-polyol; and
- d) at least one low molecular weight polymer obtained by polymerization of one or more olefinically unsaturated monomers.

6. I understand that rejected independent Claim 12 currently reads as follows:

A method for laminating a poly(meth)acrylate film onto a shaped article comprised of polyvinyl chloride (PVC), polypropylene, acrylonitrile/butadiene/styrene copolymer, wood or aluminum, said method comprising:

- a) applying an adhesive to the film; and
- b) joining the film to a surface of the shaped article; wherein said adhesive is a one-component, moisture-curing hot melt adhesive and

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comprises at least one reaction product with reactive NCO groups produced by reaction of

- i) at least one di- or polyisocyanate;
  - ii) at least two diols selected from the group consisting of polyether-polyols and alkylene diols, wherein at least one diol has an average molecular weight above 1,000 and at least one diol has an average molecular weight not greater than 800;
  - (iii) at least one crystalline or partly crystalline polyester-polyol; and
  - (iv) at least one low molecular weight polymer obtained by polymerization of one or more olefinically unsaturated monomers.
7. The laminating process according to the working examples set forth in the above-referenced application was performed on a profile sheathing machine. In each case, the knife gap of the machine was 50  $\mu\text{m}$ , the hot melt adhesive temperature was 130 °C and the temperature of the PVC-profile was 55 °C. The process conditions were the same for each of the Examples 2 – 7.
8. The PURMELT QR3530-24 hot melt polyurethane adhesive used in Example 5 (a comparative example) was prepared by reacting a crystalline polyester polyol, a polyether polyol having an average molecular weight of greater than 1000, a second polyether polyol having an average molecular weight of 1000, and a low molecular weight polymer obtained by polymerization of one or more olefinically unsaturated monomers with di- and/or polyisocyanates. This hot melt polyurethane adhesive thus was not prepared using a diol selected from the group consisting of polyether-polyols and alkylene diols having a molecular weight not greater than 800 (a required component of the invention claimed in claims 7-9 and 12-16 of the above-referenced application). The PURMELT QR3530-24 hot melt polyurethane adhesive therefore is very close in composition to the adhesive recited in currently pending independent claims 7 and 12, the principal difference between them being the molecular weight of

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the second polyether polyol.

9. The testing was carried out under the conditions described in the table on page 14 of the above-referenced application. The test method was a peel strength test performed by a "Universal Prüfmaschine TiraTest 28100 ".

The substrate of each sample was a rigid PVC profile on which a film was laminated. The FAST-film was a multilayer film, based on a pigmented acrylic film having as a surface layer a transparent, colorless acrylic/polyvinylidene fluoride coextruded film. The MBAS2-film was a standard polyvinyl chloride (PVC)-film. One end of each film was not laminated to the substrate and not coated with the adhesive. However, the major part of the film was laminated against the PVC profile substrate. In the case of the FAST-film, the side of the multilayer film having the pigmented acrylic film exposed was the side laminated to the substrate using the adhesive. The sample was fixed in the machine and the free end of the film was torn at a 90 ° angle to the rigid PVC profile.

10. The following values were measured and recorded as test results in the table on page 14 of the above-referenced application:

The peel strength (N/20 mm) was measured. Additionally, the manner in which the sample failed was recorded.

If the film tears without peeling of the substrate (recorded as "FT" in the table), the peel strength is limited by the properties of the laminated film. This means the peel strength of the adhesive bond (the amount of force required to peel the laminated film from the substrate) is higher than the tear strength of the film.

If an adhesive fracture was recorded ("AF-F"), the peel strength value directly shows the strength of the bonding between substrate and film.

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If no additional remarks are recorded after the peel strength value in the table, this means the cohesion of the adhesive failed.

The latter two cases show deficiencies of the adhesive.

11. The testing results show that for the samples prepared according to the method claimed in currently pending claims 7-18 (Examples 2 and 3) the peel strength of the adhesive bond was higher than the tear strengths of the film in each case. In contrast, when the acrylic film was laminated using an adhesive outside the scope of currently pending Claims 7-18 (Examples 4 and 5), an adhesive failure was noted.

12. The examples demonstrate that when an acrylic film is laminated to a substrate using an adhesive falling outside the compositional limitations of currently pending Claim 7, adhesive failure results.

However, an acrylic film bonded with an adhesive meeting the compositional limitations of currently pending Claim 7 shows fracture of the film with no loss of adhesive force.

The peel strength values measured in Example 2 (which may appear to be inferior to those obtained in Example 3) are not attributed to the adhesive itself but are due to the film portion used to prepare this particular sample. It is known in the art that any mechanical defect in a film, even on a microscopic level, will significantly deteriorate its tear strength. That is, since both Examples 2 and 3 exhibited film tear (i.e., the film tore before the adhesive failed), the peel strength values measured reflect differences in the strength of the film portion used, not differences in the strength of the adhesive bond between the film and the substrate.

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12. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such wilful false statements may jeopardize the validity of the above-referenced application or any patent issuing thereon.

Date: 17. Jan. 2007

Dr. Horst Hoffmann  
(Dr. Horst Hoffmann)